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(71)Applicant :

**KUBOTA CORP**

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(72)Inventor :

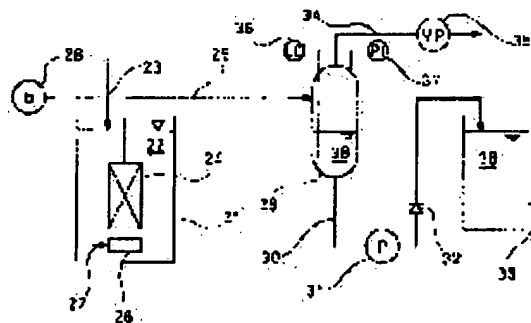
**SHIROYAMA HISAHARU  
KOIKE MITSUO**

## (54) SUCTION DEVICE FOR FILM SEPARATION UNIT

(57)Abstract:

**PURPOSE:** To smoothly take out a treating water without sucking bubbles into a treating water pump by separating gas and water in the treating water in a vacuum tank and to uniformize flux in a film separation unit by keeping the inside of a vacuum tank at a fixed negative pressure to stabilize suction efficiency.

**CONSTITUTION:** The film separation unit 24 is dipped and arranged in a film separation vessel 21 into which a water 22 to be treated flows and a suction pipe 25 communicated with a permeating solution flow passage in the film separation unit 24 is provided to connect to the vacuum tank 29. A treating water pipe 30 is provided to communicate with the bottom of the vacuum tank 29, the treating water pump 31 is mounted at the halfway of the treating water pipe 30 and a vacuum pump 35 is provided to communicate with the top part of the vacuum tank 29. As a result, the suction device for the film separation unit capable of constantly giving the fixed negative pressure to the film separation unit is obtained without being affected by the bubbles in a permeated solution.



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(71)出願人 000001052

株式会社クボタ

大阪府大阪市浪速区敷津東一丁目2番47号

(72)発明者 城山 久治

東京都中央区日本橋室町3丁目3番2号

株式会社クボタ東京本社内

(72)発明者 小池 三男

東京都中央区日本橋室町3丁目3番2号

株式会社クボタ東京本社内

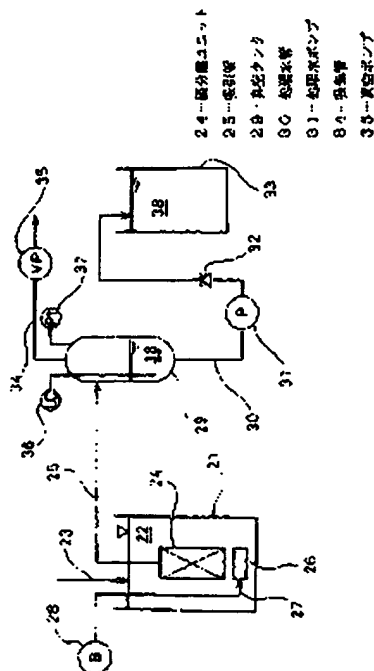
(74)代理人 弁理士 森本 義弘

(54)【発明の名称】 膜分離ユニットの吸引装置

(57)【要約】

【構成】 膜分離ユニット24の透過液流路に連通する吸引管25を真空タンク29に接続して設け、真空タンク29の底部に連通して処理水管30を設け、処理水管30の途中に処理水ポンプ31を介装し、真空タンク29の頂部に連通して真空ポンプ35を設けた。

【効果】 真空タンク29において処理水38の気液分離を行うことにより、処理水ポンプ31に気泡が噛み込まず、円滑な処理水38の取り出しを行うことができる。とともに、タンク内を一定の負圧に維持することにより、安定した吸引効率を得ることができ、結果として膜分離ユニット24におけるフラックスが一様なものとなる。



## 【特許請求の範囲】

【請求項1】 被処理水が流入する膜分離槽内に膜分離ユニットを浸漬配置し、膜分離ユニットの透過液流路に連通する吸引管を真空タンクに接続して設け、真空タンクの底部に連通して処理水管を設け、処理水管の途中に処理水ポンプを介装し、真空タンクの頂部に連通して真空ポンプを設けたことを特徴とする膜分離ユニットの吸引装置。

【請求項2】 被処理水が流入する膜分離槽内に膜分離ユニットを浸漬配置し、膜分離ユニットの透過液流路に連通する吸引管を吸引タンクに接続して設け、吸引タンクの底部に連通して処理水管を設け、処理水管の途中に処理水ポンプを介装し、開閉弁を介装した給水管を吸引タンクに連通して設けたことを特徴とする膜分離ユニットの吸引装置。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】 本発明は、槽内において固液分離を行う膜分離ユニットの吸引装置に関する。

## 【0002】

【従来の技術】 従来、水処理において濾過装置を用いる構成としては、例えば図3に示すようなものがある。図3において、反応槽1には原水供給管2を通して、下水、し尿等の原水が流入し、原水は反応槽1内の活性汚泥と混合して混合液3を形成する。また、ブローア4により空気5を送気管6を通して散気装置7に供給し、散気装置7から上方に向けて空気5を曝気する。この曝気によって混合液3中に酸素を供給するとともに、空気5のエアリフト作用により生起する上昇攪拌流によって反応槽1内の混合液3を攪拌混合しながら槽内で循環させる。

【0003】 一方、膜分離ユニット8によって反応槽1内の混合液3を固液分離し、膜分離ユニット8の透過膜を透過した透過液は処理水9として吸引ポンプ10により吸引管11を通して処理水槽12に取り出す。

## 【0004】

【発明が解決しようとする課題】 しかし、上記した従来の構成において、ユニット内部の透過液流路ないしは吸引管11が負圧であるので、膜分離ユニット8の透過膜を透過した透過液中には減圧のために気泡が生じる。この気泡が吸引ポンプ10に吸み込んで吸引作用を阻害し、膜分離ユニットにおける透過流速が低下する問題があった。

【0005】 本発明は上記課題を解決するもので、透過液中の気泡に影響されことなく、常に膜分離ユニットに一定の負圧を与えることができる膜分離ユニットの吸引装置を提供することを目的とする。

## 【0006】

【課題を解決するための手段】 上記課題を解決するために、本発明の膜分離ユニットの吸引装置は、被処理水が

流入する膜分離槽内に膜分離ユニットを浸漬配置し、膜分離ユニットの透過液流路に連通する吸引管を真空タンクに接続して設け、真空タンクの底部に連通して処理水管を設け、処理水管の途中に処理水ポンプを介装し、真空タンクの頂部に連通して真空ポンプを設けた構成としたものである。

【0007】 本発明の膜分離ユニットの吸引装置は、被処理水が流入する膜分離槽内に膜分離ユニットを浸漬配置し、膜分離ユニットの透過液流路に連通する吸引管を吸引タンクに接続して設け、吸引タンクの底部に連通して処理水管を設け、処理水管の途中に処理水ポンプを介装し、開閉弁を介装した給水管を吸引タンクに連通して設けた構成としたものである。

## 【0008】

【作用】 上記した本発明の第1の構成に係る膜分離ユニットの吸引装置においては、真空ポンプの駆動により真空タンクおよび吸引管を介して膜分離ユニットに一定の負圧を与える。この状態において、膜分離槽内に滞留する被処理水を膜分離ユニットで固液分離し、透過膜を透過した透過液を処理水として透過液流路および吸引管を通して真空タンクに吸引する。真空タンク内に流入した処理水は真空タンクの底部側に滞留し、減圧によって生じた気泡をタンク内の水面上に放出して気液が分離する。真空タンク内の処理水は処理水ポンプにより処理水管を通して外部に取り出し、真空タンク内の気体は真空ポンプによって外部に取り出す。

【0009】 したがって、真空タンクにおいて処理水の気液分離を行うことにより、処理水ポンプに気泡が吸み込まず、円滑な処理水の取り出しを行うことができるとともに、真空ポンプによって真空タンク内を一定の負圧に維持することにより、安定した吸引効率を得ることができ、結果として膜分離ユニットにおけるフラックスが一樣なものとなる。

【0010】 本発明の第2の構成に係る膜分離ユニットの吸引装置においては、運転初期時に、開閉弁を開放して給水管から吸引タンク内に始動用水を供給し、吸引タンク内を始動用水で満たす。そして、開閉弁を閉塞し、処理水ポンプにより処理水管を通して吸引タンク内の始動用水を引き抜き、吸引タンク内に負圧を生じさせる。この状態で、膜分離槽内に滞留する被処理水を膜分離ユニットで固液分離し、透過膜を透過した透過液を処理水として透過液流路および吸引管を通して吸引タンクに吸引する。吸引タンク内に流入した処理水は吸引タンクの底部側に滞留し、減圧によって生じた気泡をタンク内の水面上に放出して気液が分離する。吸引タンク内の処理水は処理水ポンプにより処理水管を通して外部に取り出す。

【0011】 したがって、吸引タンクにおいて処理水の気液分離を行うことにより、処理水ポンプに気泡が吸み込まず、円滑な処理水の取り出しを行うことができると

ともに、安定した吸引効率を得ることができ、結果として膜分離ユニットにおけるフラックスが一様なものとなる。

#### 【0012】

【実施例】以下、本発明の一実施例を図面に基づいて説明する。図1において、膜分離槽21の内部には被処理水22を貯留しており、この被処理水22は原水供給管23を通して供給する下水やし尿等の原水と活性汚泥との混合液である。

【0013】被処理水22の適当水深下に膜分離ユニット24を浸漬配置しており、膜分離ユニット24は板状をなす複数の膜モジュールを適当間隔をおいて上下方向に平行に配置したものであり、各膜モジュールの透過液流路に連通して吸引管25を設けている。また、膜分離槽21の底部には膜分離ユニット24の下方に位置して散気管26を配置しており、散気管26には送気管27を介してブローア28を接続している。

【0014】吸引管25は真空タンク29に連通しており、真空タンク29の底部には処理水管30が開口している。処理水管30の途中には処理水ポンプ31および逆止弁32を介装しており、処理水管30の先端は処理水槽33に開口している。また、真空タンク29の頂部に開口して吸気管34を設けており、吸気管34には真空ポンプ35を接続している。さらに、真空タンク29には水位計36および圧力計37を設けている。

【0015】以下、上記構成における作用を説明する。ブローア28により送気管27を通して散気管26に空気を供給し、散気管26から上方に向けて曝気する。この曝気した空気のエアリフト作用により生起する上昇攪拌流によって、膜分離槽21内の被処理水22を攪拌し、かつ槽内で循環させる。

【0016】一方、真空ポンプ35の駆動により真空タンク29内の気体を吸気管34を通して外部に排出し、圧力計37で計測しながら真空タンク29内を一定の負圧に維持することにより、真空タンク29および吸引管25を介して膜分離ユニット24に一定の負圧を与える。この状態において、膜分離槽21内に滞留する被処理水22を膜分離ユニット24で固液分離し、透過膜を透過した透過液を処理水として透過液流路および吸引管25を通して真空タンク29に吸引する。

【0017】真空タンク29内に流入した処理水38は真空タンク29の底部側に滞留し、減圧によって生じた気泡をタンク内の水面上に放出して気液が分離する。真空タンク29内の気体は真空ポンプ35により吸気管34を通して外部に取り出す。また、水位計36で計測する真空タンク29内の水位が一定水位に達した時点で、処理水ポンプ31を駆動し、処理水管30および逆止弁32を通して真空タンク29内の処理水38を処理水槽33に取り出す。

【0018】図2は本発明の他の実施例を示すものであ

り、先の実施例と同様の作用を行う部材については同一番号を付して説明を省略する。図2において、吸引管25は密封式の吸引タンク41に連通しており、吸引タンク41の底部に連通して処理水管30を設けている。

【0019】吸引タンク41の上部には給水管42が開口しており、給水管42には開閉弁43を介装している。また、吸引タンク41の上部には逆止弁44を介装した排気管45が連通している。

【0020】この構成においては、運転初期時に、開閉弁43を開放して給水管42から吸引タンク41内に始動用水を供給し、排気管45および逆止弁44を通して吸引タンク41内の空気を排出しながら、吸引タンク41内を始動用水で満たす。そして、開閉弁43を閉塞し、処理水ポンプ31により処理水管30を通して吸引タンク41内の始動用水を引き抜き、吸引タンク41内に負圧を生じさせる。

【0021】この状態で、膜分離槽21内に滞留する被処理水22を膜分離ユニット24で固液分離し、透過膜を透過した透過液を処理水38として透過液流路および吸引管25を通して吸引タンク41に吸引する。吸引タンク41内に流入した処理水38は吸引タンク41の底部側に滞留し、減圧によって生じた気泡をタンク内の水面上に放出して気液が分離する。そして、吸引タンク41内の処理水38を処理水ポンプ31により処理水管を通して連続して吸引し、吸引タンク41内を一定の負圧に維持するとともに、処理水38を処理水槽33に取り出す。

#### 【0022】

【発明の効果】以上述べたように本発明によれば、真空タンクないし吸引タンクにおいて処理水の気液分離を行うことにより、処理水ポンプに気泡が吸み込まず、円滑な処理水の取り出しを行うことができるとともに、タンク内を一定の負圧に維持することにより、安定した吸引効率を得ることができ、結果として膜分離ユニットにおけるフラックスが一様なものとなる。

#### 【図面の簡単な説明】

【図1】本発明の一実施例における膜分離ユニットの吸引装置の全体構成図である。

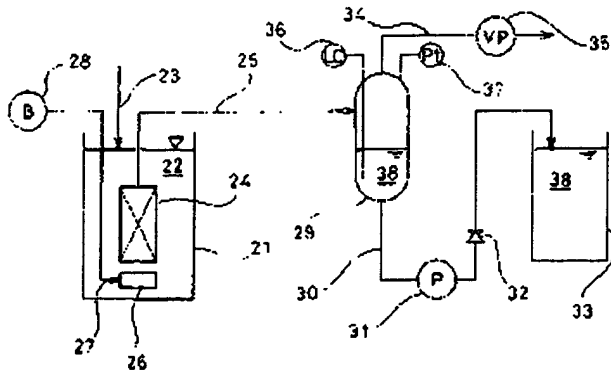
【図2】本発明の他の実施例における膜分離ユニットの吸引装置の全体構成図である。

【図3】従来の浸漬型透過装置の全体構成図である。

#### 【符号の説明】

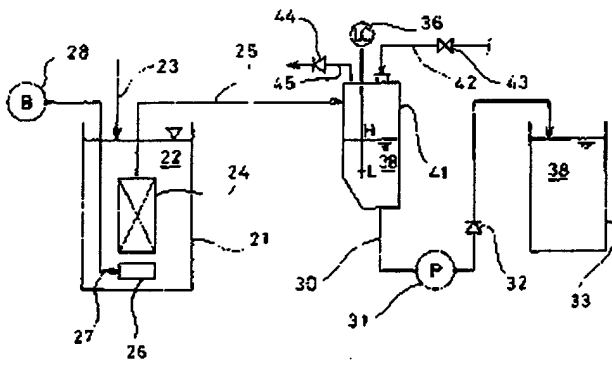
- 24 膜分離ユニット
- 25 吸引管
- 29 真空タンク
- 30 処理水管
- 31 処理水ポンプ
- 34 吸気管
- 35 真空ポンプ

【図1】

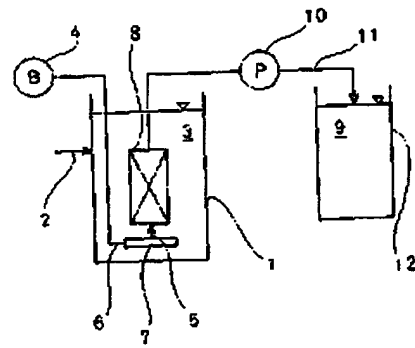


- 24…真空脱離ユニット  
25…吸引管  
29…真空タンク  
30…処理水管  
31…処理水ポンプ  
34…吸引管  
36…真空ポンプ

【図2】



【図3】



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**CLAIMS**

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[Claim(s)]

[Claim 1] The aspirator of the membrane-separation unit characterized by having carried out immersion arrangement of the membrane-separation unit into the membrane-separation tub into which processed water flows, having connected with the vacuum tank, having prepared the siphon which is open for free passage to the transparency liquid flow channel of a membrane-separation unit, it having been open for free passage at the pars basilaris ossis occipitalis of a vacuum tank, and having formed treated water tubing, having infixed the treated water pump in the middle of treated water tubing, having been open for free passage in the crowning of a vacuum tank, and forming a vacuum pump.

[Claim 2] The aspirator of the membrane-separation unit characterized by to have carried out immersion arrangement of the membrane-separation unit into the membrane-separation tub into which processed water flows, to have connected with the attraction tank, to have prepared the siphon which is open for free passage to the transparency liquid flow channel of a membrane-separation unit, to have been open for free passage at the pars basilaris ossis occipitalis of an attraction tank, to have formed treated water tubing, and to open for free passage and form the feed pipe which infixed the treated water pump in the middle of treated water tubing, and infixed the closing motion valve in an attraction tank.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the aspirator of the membrane-separation unit which performs solid liquid separation in a tub.

[0002]

[Description of the Prior Art] Conventionally, there is a thing as shown, for example in drawing 3 as a configuration using a filter in water treatment. In drawing 3, to a reaction vessel 1, it lets the raw water supply pipe 2 pass, and raw water, such as sewage and nightsoil, flows, it mixes with the active sludge in a reaction vessel 1, and raw water forms mixed liquor 3. Moreover, air 5 is supplied to a diffuser 7 through an airpipe 6 by the blower 4, and aeration of the air 5 is carried out towards the upper part from a diffuser 7. It is made to circulate within a tub, while supplying oxygen into mixed liquor 3 by this aeration, carrying out stirring mixing of the mixed liquor 3 in a reaction vessel 1 by the lifting stirring style which occurs according to an airlift operation of air 5.

[0003] On the other hand, solid liquid separation of the mixed liquor 3 in a reaction vessel 1 is carried out with the membrane-separation unit 8, and the transparency liquid which penetrated the filtration membrane of the membrane-separation unit 8 is taken out to the treated water tub 12 through the siphon 11 with a suction pump 10 as treated water 9.

[0004]

[Problem(s) to be Solved by the Invention] However, in the above-mentioned conventional configuration, since the transparency liquid flow channel or siphon 11 inside a unit is negative pressure, in the transparency liquid which penetrated the filtration membrane of the membrane-separation unit 8, air bubbles arise for reduced pressure. These air bubbles checked the suction effect by \*\*\*\*\* to the suction pump 10, and there was a problem to which the transparency rate of flow in a membrane-separation unit falls.

[0005] It aims at offering the aspirator of the membrane-separation unit which can always give fixed negative pressure to a membrane-separation unit, without this invention's solving the above-mentioned technical problem, and being affected by the air bubbles in transparency liquid.

[0006]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, it connects with a vacuum tank, the siphon which the aspirator of the membrane-separation unit of this invention carries out immersion arrangement of the membrane-separation unit into the membrane-separation tub into which processed water flows, and is open for free passage to the transparency liquid flow channel of a membrane-separation unit is prepared, it is open for free passage at the pars basilaris ossis occipitalis of a vacuum tank, treated water tubing is formed, and a treated water pump is infixed in the middle of treated water tubing, and it considers as the configuration which was open for free passage in the crowning of a vacuum tank, and formed the vacuum pump.

[0007] It carries out as the configuration which the aspirator of the membrane-separation unit of this invention carried out immersion arrangement of the membrane-separation unit into the membrane-separation tub into which processed water flows, connected with the attraction tank, prepared the siphon which is open for free passage to the transparency liquid flow channel of a membrane-separation unit, was open for free passage at the pars basilaris ossis occipitalis of an attraction tank, formed treated-water tubing, and opened for free



passage and formed the feed pipe which infixed the treated-water pump in the middle of treated-water tubing, and infixed the closing-motion valve in an attraction tank.

[0008]

[Function] In the aspirator of the membrane-separation unit concerning the 1st configuration of above-mentioned this invention, fixed negative pressure is given to a membrane-separation unit through a vacuum tank and the siphon by actuation of a vacuum pump. In this condition, solid liquid separation of the processed water which piles up in a membrane-separation tub is carried out in a membrane-separation unit, and it draws in to a vacuum tank through a transparency liquid flow channel and the siphon by using as treated water the transparency liquid which penetrated the filtration membrane. The treated water which flowed in the vacuum tank piles up in the pars-basilaris-ossis-occipitalis side of a vacuum tank, emits the air bubbles produced with reduced pressure on the water surface in a tank, and vapor-liquid separates it. The gas in ejection and a vacuum tank takes out the treated water in a vacuum tank outside a vacuum pump through treated water tubing with a treated water pump.

[0009] Therefore, while air bubbles can perform ejection of \*\*\*\*\* and smooth treated water on a treated water pump by performing vapor liquid separation of treated water in a vacuum tank, by maintaining the inside of a vacuum tank to fixed negative pressure with a vacuum pump, the stable attraction effectiveness can be acquired and the flux in a membrane-separation unit will become uniform as a result.

[0010] the aspirator of the membrane-separation unit concerning the 2nd configuration of this invention -- setting -- the time of the early stages of operation -- a closing motion valve -- opening -- the inside of an attraction tank from a feed pipe -- start up -- service water -- supplying -- the inside of an attraction tank -- start up -- it fills with service water. and a closing motion valve -- blockading -- a treated water pump -- treated water tubing -- letting it pass -- the start up in an attraction tank -- service water is drawn out and negative pressure is produced in an attraction tank. In this condition, solid liquid separation of the processed water which piles up in a membrane-separation tub is carried out in a membrane-separation unit, and it draws in on an attraction tank through a transparency liquid flow channel and the siphon by using as treated water the transparency liquid which penetrated the filtration membrane. The treated water which flowed in the attraction tank piles up in the pars-basilaris-ossis-occipitalis side of an attraction tank, emits the air bubbles produced with reduced pressure on the water surface in a tank, and vapor-liquid separates it. The treated water in an attraction tank is taken out outside through treated water tubing with a treated water pump.

[0011] Therefore, while air bubbles can perform ejection of \*\*\*\*\* and smooth treated water on a treated water pump by performing vapor liquid separation of treated water in an attraction tank, the stable attraction effectiveness can be acquired and the flux in a membrane-separation unit will become uniform as a result.

[0012]

[Example] Hereafter, one example of this invention is explained based on a drawing. In drawing 1, processed water 22 is stored in the interior of the membrane-separation tub 21, and this processed water 22 is the mixed liquor of raw water, such as sewage coconut urine supplied through the raw water supply pipe 23, and active sludge.

[0013] Immersion arrangement of the membrane-separation unit 24 is carried out under the suitable depth of water of processed water 22, and two or more membrane modules which make tabular were set, and have been arranged to parallel in the vertical direction, and the membrane-separation unit 24 opened the suitable gap for free passage for them to the transparency liquid flow channel of each membrane module, and has formed the siphon 25. Moreover, it was located in the pars basilaris ossis occipitalis of the membrane-separation tub 21 under the membrane-separation unit 24, the powder trachea 26 is arranged, and the blower 28 is connected to the powder trachea 26 through an airpipe 27.

[0014] The siphon 25 is open for free passage to the vacuum tank 29, and the treated water tubing 30 is carrying out opening to the pars basilaris ossis occipitalis of a vacuum tank 29. In the middle of the treated water tubing 30, the treated water pump 31 and the check valve 32 are infixed, and opening of the head of the treated water tubing 30 is carried out to the treated water tub 33. Moreover, opening was carried out to the crowning of a vacuum tank 29, the inlet pipe 34 is formed, and the vacuum pump 35 is connected to an inlet pipe 34. Furthermore, the water gauge 36 and the pressure gauge 37 are formed in the vacuum tank 29.

[0015] the following and above-mentioned configuration -- the operation to kick is explained. Air is supplied to

the powder trachea 26 through an airpipe 27 by the blower 28, and aeration is carried out towards the upper part from the powder trachea 26. The processed water 22 in the membrane-separation tub 21 is stirred, and it is made to circulate within a tub by the lifting stirring style which occurs according to this airlift operation of air that carried out aeration.

[0016] On the other hand, fixed negative pressure is given to the membrane-separation unit 24 through a vacuum tank 29 and the siphon 25 by maintaining the inside of a vacuum tank 29 to fixed negative pressure, discharging the gas in a vacuum tank 29 outside through an inlet pipe 34 by actuation of a vacuum pump 35, and measuring with a pressure gage 37. In this condition, solid liquid separation of the processed water 22 which piles up in the membrane-separation tub 21 is carried out in the membrane-separation unit 24, and it draws in to a vacuum tank 29 through a transparency liquid flow channel and the siphon 25 by using as treated water the transparency liquid which penetrated the filtration membrane.

[0017] The treated water 38 which flowed in the vacuum tank 29 piles up in the pars-basilaris-ossis-occipitalis side of a vacuum tank 29, emits the air bubbles produced with reduced pressure on the water surface in a tank, and vapor-liquid separates it. The gas in a vacuum tank 29 is taken out outside through an inlet pipe 34 with a vacuum pump 35. Moreover, when the water level in the vacuum tank 29 measured with a water gauge 36 reaches at least fixed water, the treated water pump 31 is driven and the treated water 38 in a vacuum tank 29 is taken out to the treated water tub 33 through the treated water tubing 30 and a check valve 32.

[0018] Drawing 2 shows other examples of this invention, attaches the same number about the member which performs the same operation as a previous example, and omits explanation. In drawing 2, the siphon 25 was open for free passage on the seal-type attraction tank 41, was open for free passage at the pars basilaris ossis occipitalis of the attraction tank 41, and has formed the treated water tubing 30.

[0019] The feed pipe 42 is carrying out opening to the upper part of the attraction tank 41, and the closing motion valve 43 is infixed in a feed pipe 42. Moreover, in the upper part of the attraction tank 41, the exhaust pipe 45 which infixed the check valve 44 is open for free passage.

[0020] this configuration -- setting -- the time of the early stages of operation -- the closing motion valve 43 -- opening -- the inside of the attraction tank 41 from a feed pipe 42 -- start up -- while supplying service water and discharging the air in the attraction tank 41 through an exhaust pipe 45 and a check valve 44 -- the inside of the attraction tank 41 -- start up -- it fills with service water. and the closing motion valve 43 -- blockading - - the treated water pump 31 -- the treated water tubing 30 -- letting it pass -- the start up in the attraction tank 41 -- service water is drawn out and negative pressure is produced in the attraction tank 41.

[0021] In this condition, solid liquid separation of the processed water 22 which piles up in the membrane-separation tub 21 is carried out in the membrane-separation unit 24, and it draws in on the attraction tank 41 through a transparency liquid flow channel and the siphon 25 by using as treated water 38 the transparency liquid which penetrated the filtration membrane. The treated water 38 which flowed in the attraction tank 41 piles up in the pars-basilaris-ossis-occipitalis side of the attraction tank 41, emits the air bubbles produced with reduced pressure on the water surface in a tank, and vapor-liquid separates it. And while attracting the treated water 38 in the attraction tank 41 continuously through treated water tubing with the treated water pump 31 and maintaining the inside of the attraction tank 41 to fixed negative pressure, treated water 38 is taken out to the treated water tub 33.

[0022]

[Effect of the Invention] As stated above, while air bubbles can perform ejection of \*\*\*\*\* and smooth treated water on a treated water pump by performing vapor liquid separation of treated water in a vacuum tank thru/or an attraction tank according to this invention, by maintaining the inside of a tank to fixed negative pressure, the stable attraction effectiveness can be acquired and the flux in a membrane-separation unit will become uniform as a result.

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**TECHNICAL FIELD**

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[Industrial Application] This invention relates to the aspirator of the membrane-separation unit which performs solid liquid separation in a tub.

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**PRIOR ART**

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[Description of the Prior Art] Conventionally, there is a thing as shown, for example in drawing 3 as a configuration using a filter in water treatment. In drawing 3, to a reaction vessel 1, it lets the raw water supply pipe 2 pass, and raw water, such as sewage and nightsoil, flows, it mixes with the active sludge in a reaction vessel 1, and raw water forms mixed liquor 3. Moreover, air 5 is supplied to a diffuser 7 through an airpipe 6 by the blower 4, and aeration of the air 5 is carried out towards the upper part from a diffuser 7. It is made to circulate within a tub, while supplying oxygen into mixed liquor 3 by this aeration, carrying out stirring mixing of the mixed liquor 3 in a reaction vessel 1 by the lifting stirring style which occurs according to an airlift operation of air 5.

[0003] On the other hand, solid liquid separation of the mixed liquor 3 in a reaction vessel 1 is carried out with the membrane-separation unit 8, and the transparency liquid which penetrated the filtration membrane of the membrane-separation unit 8 is taken out to the treated water tub 12 through the siphon 11 with a suction pump 10 as treated water 9.

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**EFFECT OF THE INVENTION**

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[Effect of the Invention] As stated above, while air bubbles can perform ejection of\*\*\*\*\* and smooth treated water on a treated water pump by performing vapor liquid separation of treated water in a vacuum tank thru/or an attraction tank according to this invention, by maintaining the inside of a tank to fixed negative pressure, the stable attraction effectiveness can be acquired and the flux in a membrane-separation unit will become uniform as a result.

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**TECHNICAL PROBLEM**

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[Problem(s) to be Solved by the Invention] However, in the above-mentioned conventional configuration, since the transparency liquid flow channel or siphon 11 inside a unit is negative pressure, in the transparency liquid which penetrated the filtration membrane of the membrane-separation unit 8, air bubbles arise for reduced pressure. These air bubbles checked the suction effect by \*\*\*\*\* to the suction pump 10, and there was a problem to which the transparency rate of flow in a membrane-separation unit falls.

[0005] It aims at offering the aspirator of the membrane-separation unit which can always give fixed negative pressure to a membrane-separation unit, without this invention's solving the above-mentioned technical problem, and being affected by the air bubbles in transparency liquid.

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**MEANS**

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[Means for Solving the Problem] In order to solve the above-mentioned technical problem, it connects with a vacuum tank, the siphon which the aspirator of the membrane-separation unit of this invention carries out immersion arrangement of the membrane-separation unit into the membrane-separation tub into which processed water flows, and is open for free passage to the transparency liquid flow channel of a membrane-separation unit is prepared, it is open for free passage at the pars basilaris ossis occipitalis of a vacuum tank, treated water tubing is formed, and a treated water pump is infixed in the middle of treated water tubing, and it considers as the configuration which was open for free passage in the crowning of a vacuum tank, and formed the vacuum pump.

[0007] It carries out as the configuration which the aspirator of the membrane-separation unit of this invention carried out immersion arrangement of the membrane-separation unit into the membrane-separation tub into which processed water flows, connected with the attraction tank, prepared the siphon which is open for free passage to the transparency liquid flow channel of a membrane-separation unit, was open for free passage at the pars basilaris ossis occipitalis of an attraction tank, formed treated-water tubing, and opened for free passage and formed the feed pipe which infixed the treated-water pump in the middle of treated-water tubing, and infixed the closing-motion valve in an attraction tank.

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## OPERATION

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[Function] In the aspirator of the membrane-separation unit concerning the 1st configuration of above-mentioned this invention, fixed negative pressure is given to a membrane-separation unit through a vacuum tank and the siphon by actuation of a vacuum pump. In this condition, solid liquid separation of the processed water which piles up in a membrane-separation tub is carried out in a membrane-separation unit, and it draws in to a vacuum tank through a transparency liquid flow channel and the siphon by using as treated water the transparency liquid which penetrated the filtration membrane. The treated water which flowed in the vacuum tank piles up in the pars-basilaris-ossis-occipitalis side of a vacuum tank, emits the air bubbles produced with reduced pressure on the water surface in a tank, and vapor-liquid separates it. The gas in ejection and a vacuum tank takes out the treated water in a vacuum tank outside a vacuum pump through treated water tubing with a treated water pump.

[0009] Therefore, while air bubbles can perform ejection of \*\*\*\*\* and smooth treated water on a treated water pump by performing vapor liquid separation of treated water in a vacuum tank, by maintaining the inside of a vacuum tank to fixed negative pressure with a vacuum pump, the stable attraction effectiveness can be acquired and the flux in a membrane-separation unit will become uniform as a result.

[0010] the aspirator of the membrane-separation unit concerning the 2nd configuration of this invention -- setting -- the time of the early stages of operation -- a closing motion valve -- opening -- the inside of an attraction tank from a feed pipe -- start up -- service water -- supplying -- the inside of an attraction tank -- start up -- it fills with service water. and a closing motion valve -- blockading -- a treated water pump -- treated water tubing -- letting it pass -- the start up in an attraction tank -- service water is drawn out and negative pressure is produced in an attraction tank. In this condition, solid liquid separation of the processed water which piles up in a membrane-separation tub is carried out in a membrane-separation unit, and it draws in on an attraction tank through a transparency liquid flow channel and the siphon by using as treated water the transparency liquid which penetrated the filtration membrane. The treated water which flowed in the attraction tank piles up in the pars-basilaris-ossis-occipitalis side of an attraction tank, emits the air bubbles produced with reduced pressure on the water surface in a tank, and vapor-liquid separates it. The treated water in an attraction tank is taken out outside through treated water tubing with a treated water pump.

[0011] Therefore, while air bubbles can perform ejection of \*\*\*\*\* and smooth treated water on a treated water pump by performing vapor liquid separation of treated water in an attraction tank, the stable attraction effectiveness can be acquired and the flux in a membrane-separation unit will become uniform as a result.

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## EXAMPLE

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[Example] Hereafter, one example of this invention is explained based on a drawing. In drawing 1, processed water 22 is stored in the interior of the membrane-separation tub 21, and this processed water 22 is the mixed liquor of raw water, such as sewage coconut urine supplied through the raw water supply pipe 23, and active sludge.

[0013] Immersion arrangement of the membrane-separation unit 24 is carried out under the suitable depth of water of processed water 22, and two or more membrane modules which make tabular were set, and have been arranged to parallel in the vertical direction, and the membrane-separation unit 24 opened the suitable gap for free passage for them to the transparency liquid flow channel of each membrane module, and has formed the siphon 25. Moreover, it was located in the pars basilaris ossis occipitalis of the membrane-separation tub 21 under the membrane-separation unit 24, the powder trachea 26 is arranged, and the blower 28 is connected to the powder trachea 26 through an airpipe 27.

[0014] The siphon 25 is open for free passage to the vacuum tank 29, and the treated water tubing 30 is carrying out opening to the pars basilaris ossis occipitalis of a vacuum tank 29. In the middle of the treated water tubing 30, the treated water pump 31 and the check valve 32 are infixed, and opening of the head of the treated water tubing 30 is carried out to the treated water tub 33. Moreover, opening was carried out to the crowning of a vacuum tank 29, the inlet pipe 34 is formed, and the vacuum pump 35 is connected to an inlet pipe 34. Furthermore, the water gauge 36 and the pressure gage 37 are formed in the vacuum tank 29.

[0015] the following and above-mentioned configuration – the operation to kick is explained. Air is supplied to the powder trachea 26 through an airpipe 27 by the blower 28, and aeration is carried out towards the upper part from the powder trachea 26. The processed water 22 in the membrane-separation tub 21 is stirred, and it is made to circulate within a tub by the lifting stirring style which occurs according to this airlift operation of air that carried out aeration.

[0016] On the other hand, fixed negative pressure is given to the membrane-separation unit 24 through a vacuum tank 29 and the siphon 25 by maintaining the inside of a vacuum tank 29 to fixed negative pressure, discharging the gas in a vacuum tank 29 outside through an inlet pipe 34 by actuation of a vacuum pump 35, and measuring with a pressure gage 37. In this condition, solid liquid separation of the processed water 22 which piles up in the membrane-separation tub 21 is carried out in the membrane-separation unit 24, and it draws in to a vacuum tank 29 through a transparency liquid flow channel and the siphon 25 by using as treated water the transparency liquid which penetrated the filtration membrane.

[0017] The treated water 38 which flowed in the vacuum tank 29 piles up in the pars-basilaris-ossis-occipitalis side of a vacuum tank 29, emits the air bubbles produced with reduced pressure on the water surface in a tank, and vapor-liquid separates it. The gas in a vacuum tank 29 is taken out outside through an inlet pipe 34 with a vacuum pump 35. Moreover, when the water level in the vacuum tank 29 measured with a water gauge 36 reaches at least fixed water, the treated water pump 31 is driven and the treated water 38 in a vacuum tank 29 is taken out to the treated water tub 33 through the treated water tubing 30 and a check valve 32.

[0018] Drawing 2 shows other examples of this invention, attaches the same number about the member which performs the same operation as a previous example, and omits explanation. In drawing 2, the siphon 25 was open for free passage on the seal-type attraction tank 41, was open for free passage at the pars basilaris ossis occipitalis of the attraction tank 41, and has formed the treated water tubing 30.

[0019] The feed pipe 42 is carrying out opening to the upper part of the attraction tank 41, and the closing

motion valve 43 is infixed in a feed pipe 42. Moreover, in the upper part of the attraction tank 41, the exhaust pipe 45 which infixed the check valve 44 is open for free passage.

[0020] this configuration -- setting -- the time of the early stages of operation -- the closing motion valve 43 -- opening -- the inside of the attraction tank 41 from a feed pipe 42 -- start up -- while supplying service water and discharging the air in the attraction tank 41 through an exhaust pipe 45 and a check valve 44 -- the inside of the attraction tank 41 -- start up -- it fills with service water. and the closing motion valve 43 -- blockading - the treated water pump 31 -- the treated water tubing 30 -- letting it pass -- the start up in the attraction tank 41 -- service water is drawn out and negative pressure is produced in the attraction tank 41.

[0021] In this condition, solid liquid separation of the processed water 22 which piles up in the membrane-separation tub 21 is carried out in the membrane-separation unit 24, and it draws in on the attraction tank 41 through a transparency liquid flow channel and the siphon 25 by using as treated water 38 the transparency liquid which penetrated the filtration membrane. The treated water 38 which flowed in the attraction tank 41 piles up in the pars-basilaris-ossis-occipitalis side of the attraction tank 41, emits the air bubbles produced with reduced pressure on the water surface in a tank, and vapor-liquid separates it. And while attracting the treated water 38 in the attraction tank 41 continuously through treated water tubing with the treated water pump 31 and maintaining the inside of the attraction tank 41 to fixed negative pressure, treated water 38 is taken out to the treated water tub 33.

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] It is the whole aspirator block diagram of the membrane-separation unit in one example of this invention.

[Drawing 2] It is the whole aspirator block diagram of the membrane-separation unit in other examples of this invention.

[Drawing 3] It is the conventional dipping former filter whole block diagram.

[Description of Notations]

24 Membrane-Separation Unit

25 Siphon

29 Vacuum Tank

30 Treated Water Tubing

31 Treated Water Pump

34 Inlet Pipe

35 Vacuum Pump

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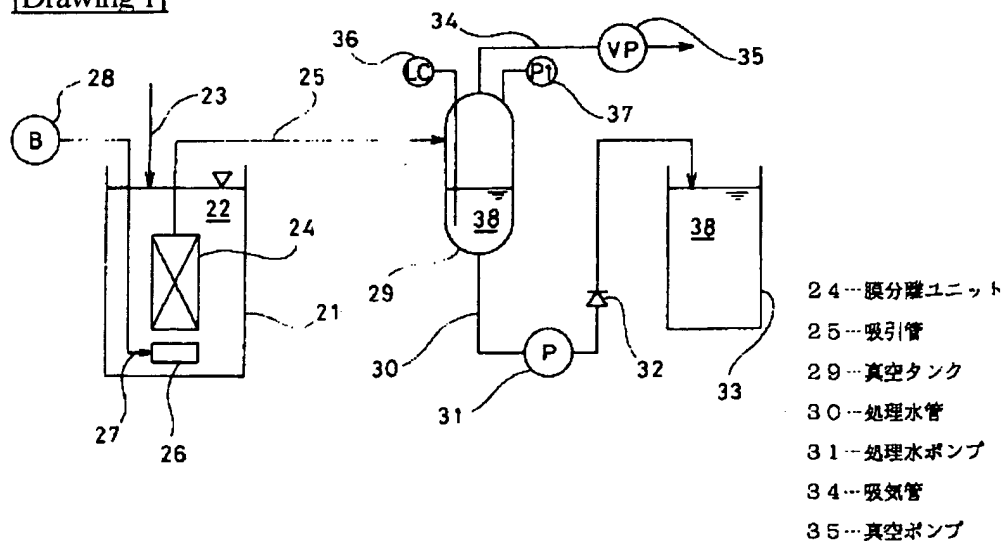
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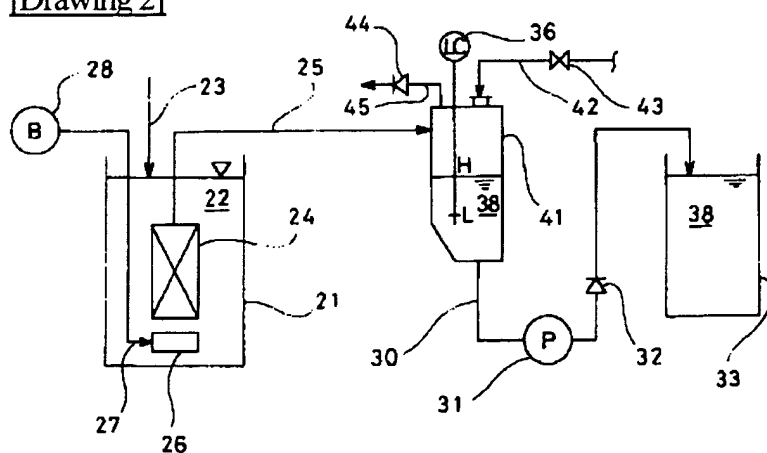
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## DRAWINGS

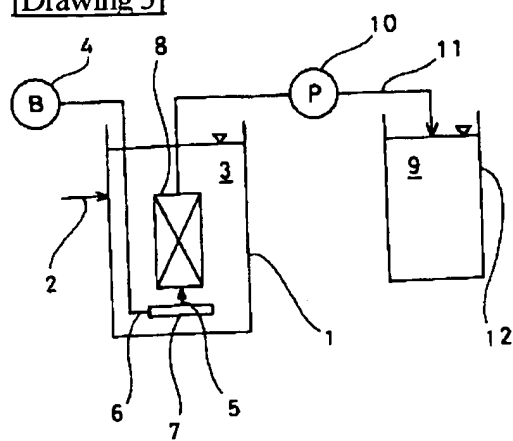
[Drawing 1]



[Drawing 2]



[Drawing 3]



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[Translation done.]